

N91 - 17058

**SYSTEMS ENGINEERING & INTEGRATION
(SE&I)**

SE&I SUMMARY

REQUIREMENTS

- MUST DEVELOP BETTER METHODS FOR DEFINING TOTAL SET OF NEEDS ALSO REQUIREMENTS FOR MULTIPLE SET OF PROGRAMS
 - CREATE TRUE CHIEF ENGINEERS OFFICE AT HDQTRS
 - DO SE&I ACROSS ALL PROGRAMS
 - ESTABLISH PRIORITY OF NEEDS TO MAXIMIZE USE OF TECHNOLOGY
- NASA SHOULD REQUIRE DEMONSTRATION OF FUNCTIONAL EQUIVALENT OF FINAL PRODUCT DURING PHASE B
 - MOVE PRR FROM PHASE C/D TO PHASE B

SE&I SUMMARY

- SE&I MUST BE RECOGNIZED AS THE TOTAL INFRASTRUCTURE THAT IS ESTABLISHED TO CONTROL METHODS, POLICIES, AND PROCEDURES FOR PRESENT AND FUTURE NASA PROGRAMS
- INCLUDES THE DEVELOPMENT OF GENERIC TOOLS NECESSARY TO SUPPORT AND ENFORCE THE METHODS, POLICIES, AND PROCEDURES DEFINED FOR SPECIFIC PROGRAMS

SE&I SUMMARY (CON'T)

RISK/REDUNDANCY

- DEVELOP BACKBONE OF ANALYSIS CAPABILITY FOR RISK MANAGEMENT IN FORM OF EASY TO USE TOOLS THAT CAN BE TAILORED BY EACH PROJECT TO ITS SPECIFIC NEEDS I.E., SPREAD SHEET FORMAT THAT EACH PROJECT FILLS IN THE DATA
- REDUNDANCY/FAULT TOLERANCE MANAGEMENT MUST BE PART OF GENERIC SE&I TOOL SET AND NOT UNIQUE TO EACH PROJECT. DOES NOT MEAN THAT SOME PROGRAM SPECIFIC TAILORING NOT DONE, BUT GENERAL GUIDELINES FOR ALL PROGRAMS

SE&I SUMMARY (CON'T)

STANDARDS

- NASA AND SE&I MUST TAKE ACTIVE LEADING ROLE IN STANDARDS COMMITTEES (AIAA, IEEE, ETC). TAKE STRONG ROLE IN DIRECTING INDUSTRY TO ESTABLISH STANDARDS THAT BENEFIT NASA
- ESTABLISH A NASA/AEROSPACE INDUSTRY WORKING GROUP TO DEFINE INTERFACE STANDARD BETWEEN NASA LABS AND INDUSTRY TO ALLOW SHARING OF DATA, MODELS, ETC. FORCE SOME LEVEL OF COMMONALITY BETWEEN NASA CENTERS

SE&I SUMMARY (CON'T)

COST

- NASA HAS HISTORY OF UNDERESTIMATING COST OF PROJECTS
 - BEGINS DROPPING FEATURES IN DDT&E THAT COST IN OPS
 - BUT OVER ESTIMATING BECOMES SELF-FULFILLING PROPHECY AND WE WILL SPEND WHATEVER WE PREDICT
- NASA MUST COME UP WITH INCENTIVE FOR CONTRACTORS TO AGREE WITH REUSE CONCEPTS. NO REASON FOR CONTRACTOR TO PROPOSE REUSE OF HARDWARE OR SOFTWARE
 - NO PROCEDURES/POLICY WITHIN NASA
 - NO GUIDELINES OF CONFIGURATION CONTROL
 - NO GUIDELINES FOR QUALITY MANAGEMENT
- NASA NEEDS TO FORMALLY ADOPT TQM
 - ESTABLISH SHORT TERM (1 YEAR) PRODUCTS/BENEFITS
 - DEMONSTRATE RESULTS
 - DEFINE MID/LONG TERM (3&7) GOALS

SE&I SUMMARY (CON'T)

TESTBED

- CONSIDER CONCEPT OF "NASA NATIONAL TEST BED" BUT DO NOT RESTRICT CONCEPT TO SINGLE CENTER OR LOCATION. CREATE COMPLIMENTARY SET OF INTERCONNECTED LABS BASED ON FUNCTION AND EXPERTISE OF EACH INDIVIDUAL CENTER
 - RECOGNIZE LABS ARE FOR BENEFIT OF INDIVIDUALS RESPONSIBLE FOR SUBSYSTEMS IN ADDITION TO ESTABLISHING CONFIDENCE FOR PROGRAM MANAGEMENT
- MUST CREATE POLICY AND TOOLS FOR TESTABILITY ACROSS PROJECTS

SE&I SUMMARY (CON'T)

OPERATIONS

- NO CHECK AND BALANCE SYSTEM FOR NASA OPERATIONS PHASE. SINCE NASA IS THE BUYER, DEVELOPER, AND USER WE HAVE NO MECHANISM OR INCENTIVE TO REDUCE COSTS.
- THERE MUST BE A CULTURAL CHANGE AT NASA FROM ADMINISTRATOR DOWN THAT FORCES TECHNOLOGY INSERTION INTO PROJECTS THAT RESULTS IN COST/EFFICIENCY BENEFITS PER PROJECT EVEN IF IT MOVES THE FUNDS TO ANOTHER PROGRAM.

SE&I SUMMARY (CON'T)

TOPICS

- **DEFINITION**
- **REQUIREMENTS**
- **COST**

RISK/REDUNDANCY MGMT

- **STANDARDS**
- **TESTBED**
- **OPERATIONS**

